

**REGION II RST 2 HEALTH AND SAFETY PLAN
EMERGENCY RESPONSE/REMOVAL ASSESSMENT/REMOVAL ACTION
(Revised 16 March 2011)**

TDD No. TO-0029-0034

Site Name: Alfred Heller Heat Training Site

Site Address: 5 Wellington Street
Clifton
Passaic County, New Jersey

Directions to Site: See Color Map on Following Page

- Head northeast on King George Rd/ King Georges Post Rd toward New St.
- Take the ramp to Garden State Pkwy
- Keep left at the fork, follow signs for Garden State Pkwy N and merge onto Garden State Pkwy (partial toll road).
- Take exit 154 to merge onto US-46 E toward Clifton.
- Slight right onto Piaget Ave.
- Turn left onto Main Ave.
- Take the 3rd right onto Troast Ct.
- Turn left onto Getty Ave.
- Take the 1st right onto Wellington St.
- Arrive at 5 Wellington St.
-

Distance to destination: 30.2 miles

Travel Duration: 37 mins.



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Historical/Current Site Information:

The Alfred Heller Heat Treating Site (the Site) is located at 5 Wellington Street in Clifton, Passaic County, New Jersey. The Site is located in a densely populated, mixed residential and light industrial area of Clifton. There are four schools located within less than a one-half mile radius of the Site. The Passaic River is less than three-quarters of a mile to the east of the Site.

The Site is a former heat treating and zinc plating/conversion coating facility. The Site is approximately four acres in size and contains six adjacent buildings within an approximate floor space of 75,000 square feet. The U.S. Environmental Protection Agency (EPA) conducted an Emergency Removal Action at the Site in 2009 that included the cleaning and dismantling of plating lines, disposal/recycling of approximately 600 drums of chemical wastes, and waste removal/cleaning of all tanks, vats, floor pits and sumps.

In May 2011, EPA initiated a groundwater and soil investigation to determine the nature and extent of trichloroethylene (TCE) contamination that resulted from Alfred Heller degreasing operations. Additional investigative work was done in January 2012. The investigations included monitoring well installations (on and off-site), soil gas sampling, on-site soil sampling and limited vapor intrusion sampling. Results of the investigations indicated that a TCE plume is migrating to the east of the Site and that potential for vapor intrusion exists for homes in that area. EPA had also initiated an on-site soil sampling assessment in November 2009. Soil samples were collected from beneath the concrete floor from sumps and other suspected contaminated areas. Soil vapor samples were also collected from the sub-slab.

In March and April 2013, EPA conducted a vapor intrusion study of the homes and a business to the east of the Site. The area included a square block between East 11th Street, Merselis Avenue, Trenton Avenue, and Howd Avenue and at the plastics manufacturing facility at the corner of Trenton Avenue and State Route 46. Sub-slab air samples were collected at 11 homes within this area, and at the manufacturing facility. Samples collected were analyzed for volatile organic compound analysis (VOC). In addition to the sub-slab air samples, an aqueous sample was collected from a subsurface stream that traverses this area and analyzed for VOC. Analytical results from these samples indicate elevated concentrations of TCE, tetrachloroethylene (PCE) and carbon tetrachloride.

RST 2 Scope of Work:

Weston Solutions, Inc. Removal Support Team 2 (RST 2) has been tasked to conduct the Phase II Removal Assessment for indoor air and sub-slab sampling, scheduled to start the week of July 8, 2013. Two RST 2 personnel will be provided to conduct indoor air and sub-slab sampling, photo-document sampling activities and locations, and maintain a site logbook of site activities. The area of work will include homes identified in the March/April sampling event with elevated concentrations of TCE, PCE and carbon tetrachloride as well as homes across the street from the elevated homes (north of Merselis Avenue and to the east of Howd Avenue). In addition, sub-slab and indoor air samples will be collected at the manufacturing facility that was sampled in March/April 2013 sampling event. Data summary tables and aerial maps showing analytical results will be developed by RST, as directed by the EPA On-Scene Coordinator (OSC). Furthermore, as directed by the OSC, RST will provide data management and compile all sampling information (GPS location data, analytical results, etc.) into a single SCRIBE database.

Three (3) S.M.A.R.T. Health and Safety Goals for the Project (Simple, Measurable, Actionable, Reasonable, & Timely):

1. Safely navigate (no accidents) while in vehicle during mobilization to the Site.
2. Safely collect indoor air samples from residences and maintain professional attitude with home-owners.
3. Maintain awareness of surroundings when entering/existing residential areas, illumination consideration.

Incident Type:

- ☐ Emergency Response
- ☒ Removal Assessment July 8, 2013 through July 24, 2013
- ☐ Removal Action
- ☐ Residential Sampling/Investigation
- ☐ PRP Oversight
- ☐ Other

Location Class:

- ☒ Industrial
- ☒ Commercial
- ☒ Urban/Residential
- ☐ Rural

U.S. EPA OSC: Chris D'Onofrio
Original HASP: Yes
Lead RST 2: Aleksandra Mallon

Date of Initial Site Activities: 7/8/2013
Site Health & Safety Coordinator: A. Mallon
Site Health & Safety Alternate: Peter Lisichenko

Response Activities/Dates of Response (fill in as applicable)

Emergency Response:

- ☐ Perimeter Recon.
- ☐ Site Entry
- ☐ Visual Documentation
- ☐ Multi-Media Sampling
- ☐ Decontamination

Removal Assessment:

- ☐ Perimeter Recon.
- ☒ Site Entry July 8, 2013 through July 24, 2013
- ☒ Visual Documentation July 8, 2013 through July 24, 2013
- ☒ Multi-Media Sampling July 8, 2013 through July 24, 2013
- ☐ Decontamination

Removal Action:

- ☐ Perimeter Recon.
- ☐ Site Entry
- ☐ Visual Documentation
- ☐ Multi-Media Sampling
- ☐ Decontamination

Physical Safety Hazards to Personnel

- | | | |
|---|---|--|
| <input checked="" type="checkbox"/> Inclement Weather – Attach FLD02 | <input checked="" type="checkbox"/> Heat – Attach FLD05 | <input type="checkbox"/> Cold – Attach FLD06 |
| <input type="checkbox"/> Confined Space – Attach FLD08 | <input type="checkbox"/> Industrial Trucks – Attach FLD09 | <input type="checkbox"/> Manual Lifting – Attach FLD10 |
| <input checked="" type="checkbox"/> Terrain – Attach FLD11 | <input type="checkbox"/> Structural Integrity – Attach FLD13 | <input type="checkbox"/> Site Security |
| <input type="checkbox"/> Pressurized Containers, Systems – Attach FLD16 | <input type="checkbox"/> Use of Boats – Attach FLD18 | <input type="checkbox"/> Waterways – Attach FLD19 |
| <input type="checkbox"/> Explosives – Attach FLD21 | <input type="checkbox"/> Heavy Equipment – Attach FLD22 | <input type="checkbox"/> Aerial Lifts and Manlifts – Attach FLD24 |
| <input type="checkbox"/> Elevated Surfaces and Fall Protection – Attach FLD25 | <input type="checkbox"/> Ladders – Attach FLD26 | <input type="checkbox"/> Excavations/Trenching – Attach FLD28 |
| <input type="checkbox"/> Fire Prevention – Attach FLD31 | <input type="checkbox"/> Demolition – Attach FLD33 | <input type="checkbox"/> Underground/Overhead Utilities – Attach FLD34 |
| <input checked="" type="checkbox"/> Hand and Power Tools – Attach FLD38 | <input checked="" type="checkbox"/> Illumination – Attach FLD39 | <input type="checkbox"/> Storage Tanks – Attach FLD40 |
| <input type="checkbox"/> Lead Exposure – Attach FLD46 | <input checked="" type="checkbox"/> Sample Storage – Attach FLD49 | <input type="checkbox"/> Cadmium Exposure – Attach FLD50 |
| <input type="checkbox"/> Asbestos Exposure – Attach FLD52 | <input type="checkbox"/> Hexavalent Chromium Exposure – Attach FLD 53 | <input type="checkbox"/> Benzene Exposure – Attach FLD 54 |
| <input type="checkbox"/> Drilling Safety – Attach FLD56 | <input type="checkbox"/> Drum Handling – Attach FLD58 | <input type="checkbox"/> Gasoline Contaminant Exposure – Attach FLD61 |

- ☐ Noise — Attach CECHSP, Section 7
- ☒ Walking/Working Surfaces
- ☐ Oxygen Deficiency
- ☐ Unknowns in Tanks or Drums
- ☐ Nonionizing Radiation
- ☐ Ionizing Radiation

Biological Hazards to Personnel

- ☐ Infectious/Medical/Hospital Waste — Attach FLD 44 and 45
- ☐ Non-domesticated Animals — Attach FLD43A
- ☐ Insects — Attach FLD 43B
- ☐ Poisonous Plants/Vegetation — Attach FLD 43D
- ☐ Raw Sewage
- ☐ Bloodborne Pathogens — Attach FLD 44 and 45

Training Requirements

- ☒ 40-Hour HAZWOPER Training with three days supervised experience
- ☐ 8-Hour Management or Supervisor Training in addition to basic training course
- ☒ 8-Hour Annual Refresher Health and Safety Training
- ☐ Site Specific Health and Safety Training
- ☐ DOT (CMV Training - ERV in Use)
- ☐ Bio-Medical Collection and Response

Medical Surveillance Requirements

- ☒ Baseline initial physical examination with physician certification
- ☒ Annual medical examination with physician certification
- ☐ Site Specific medical monitoring protocol (Radiation, Heavy Metals)
- ☐ Asbestos Worker medical protocol

Vehicle Use Assessment and Selection

Driving is one of the most hazardous and frequent activities for Weston Employees. As such, Weston Employees are required to adhere to established safe operating practices in order to maintain their eligibility to drive Weston owned, leased, or rented vehicles. Every person riding in a Weston vehicle, including passengers must maintain a commitment for a safe journey. This means being attentive while in the vehicle and helping the driver to notice hazards ahead of and around the vehicle and ensure that their presence does not distract the driver from safely operating the vehicle.

A high percentage of vehicle accidents occur when operating in reverse. Anytime a vehicle is operated in reverse, e.g., backing out of a parking area, if there are passengers, at least one of them are to assist the driver by acting as a guide person during the reverse movement or during other vehicle operation where it would be prudent to have a guide person(s) participate in the vehicle movement. When practical, the preferred parking method would be to back into the parking area.

At a minimum, each Weston Driver must:

- Possess a current, valid drivers' license.
- Obey posted speed limits and other traffic laws.
- Wear seat belts at all times while the vehicle is in operation.
- Conduct a 360 degree inspection around the vehicle before attempting to drive the vehicle.
- Report accidents / incidents immediately and complete a Notice of Incident (NOI).
- Keep vehicles on approved roadways (4WD doesn't guarantee mobility on unapproved surfaces).

All Region II RST 2 personnel are experienced and qualified to drive RST 2 fleet vehicles (Tahoe, Suburbans, Minivan/Cargo Van, and Emergency Response Vehicle). However, in the event that vehicle rental is required, each person must take the time to familiarize themselves with that particular vehicle. This familiarization includes adjustment of the dashboard knobs/controls, mirrors, steering wheel, seats, and a 360 degree external inspection of the vehicle.

1. The following vehicles are anticipated to be used on this project:

- | | |
|---|---|
| <input type="checkbox"/> Car | <input type="checkbox"/> Pickup Truck |
| <input type="checkbox"/> Intermediate/Standard SUV
(e.g. Chevy Trailblazer, Chevy Tahoe, Ford Explorer, Ford Escape) | <input checked="" type="checkbox"/> Full Size SUV (e.g. Chevy Suburban, Ford Expedition, GMC Yukon) |
| <input checked="" type="checkbox"/> Minivan/Cargo Van (e.g. Chevy Uplander) | <input type="checkbox"/> Box Truck (Size: _____) |
| <input type="checkbox"/> Emergency Response Vehicle (ERV) | <input type="checkbox"/> Other _____ |

2. Are there any on-site considerations that should be noted:

- | | | | |
|--|---|--|---------------------------------------|
| <input checked="" type="checkbox"/> Working/Driving Surfaces | <input checked="" type="checkbox"/> Debris | <input checked="" type="checkbox"/> Overhead Clearance | <input type="checkbox"/> Obstructions |
| <input type="checkbox"/> Tire Puncture Hazards | <input checked="" type="checkbox"/> Vegetation | <input type="checkbox"/> Terrain | <input type="checkbox"/> Parking |
| <input type="checkbox"/> Congestion | <input type="checkbox"/> Site Entry/Exit Hazards | <input checked="" type="checkbox"/> Local Traffic Volume | <input type="checkbox"/> Security |
| <input type="checkbox"/> Heavy Equipment | <input checked="" type="checkbox"/> Time/Length of Work Day | <input type="checkbox"/> Other: | |

Do any of the considerations above require further explanation? No

3. Was the Weston Environmental Risk Management tool completed in EHS? Yes

Was an Environmental Compliance Plan Required? No

4. Are there any seasonal considerations that should be noted (e.g., Anticipated Snowy Conditions):

No.

5. Is a Traffic Control Plan required? ☐ Yes ☒ No

Physical Parameters	Chemical Contaminant Tetrachloroethylene (PCE)	Chemical Contaminant Carbon Tetrachloride	Chemical Contaminant Trichloroethylene (TCE)
Exposure Limits IDLH Level	<u>100</u> ppm <u> </u> mg/m ³ PEL <u>100</u> ppm <u> </u> mg/m ³ TLV / REL <u>1000</u> ppm <u> </u> mg/m ³ IDLH	<u>10</u> ppm <u> </u> mg/m ³ PEL <u>2</u> ppm <u>12.6</u> mg/m ³ REL <u>200</u> ppm <u> </u> mg/m ³ IDLH	<u>100</u> ppm <u>537</u> mg/m ³ PEL <u>25 (10 hour)</u> ppm <u> </u> mg/m ³ REL <u>Ca 1000</u> ppm <u> </u> mg/m ³ IDLH
Physical Form (Solid/Liquid/Gas) Color	<u> </u> Solid <u> </u> Liquid <u>X</u> Gas <u>Colorless Liquid</u> Color	<u> </u> Solid <u> </u> Liquid <u>X</u> Gas <u>Colorless liquid with a characteristic ether-like odor.</u>	<u> </u> Solid <u>X</u> Liquid <u> </u> Gas <u>Colorless unless dyed blue</u> Color
Odor	Chloroform-like odor	Ether-like odor	Chloroform-like odor
Flash Point Flammable Limits	<u>N/A</u> Degrees F or C <u>10.5</u> % UEL <u>8</u> % LEL	<u>NA</u> Degrees F or C <u>NA</u> % UEL <u>NA</u> % LEL	<u>?</u> Degrees F or C <u>10.5</u> % UEL <u>8</u> % LEL
Specific Gravity	<u>1.46</u> Water = 1	<u>1.59</u> Water = 1	<u>1.46</u> Water = 1
Solubility	Slightly Soluble in Water (0.1%)	0.05%	0.1%
Incompatible Materials	Incompatible with strong caustics and alkalis; chemically-active metals (i.e.: barium, lithium, sodium, magnesium, titanium)	Chemically-active metals such as sodium, potassium & magnesium; fluorine; aluminum [Note: Forms highly toxic phosgene gas when exposed to flames or welding arcs.]	Strong caustics & alkalis; chemically-active metals (such as barium, lithium, sodium, magnesium, titanium, & beryllium)
Routes of Exposure	<u>X</u> Inh <u>X</u> Abs <u>X</u> Con <u>X</u> Ing	<u>X</u> Inh <u>X</u> Abs <u>X</u> Con <u>X</u> Ing	<u>X</u> Inh <u>X</u> Abs <u>X</u> Con <u>X</u> Ing
Symptoms of Acute Exposure	Irritation to eyes, skin; headache, visual disturbance, lassitude, dizziness, tremor [potential occupational carcinogen]	Irritation eyes, skin; central nervous system depression; nausea, vomiting; liver, kidney injury; drowsiness, dizziness, incoordination; [potential occupational carcinogen]	Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomit; dermatitis; cardiac arrhythmias, paresthesia; liver injury; potential occupational carcinogen
First Aid Treatment	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Immediate medical attention	Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately	Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately
Ionization Potential	<u>9.45</u> eV	<u>11.47</u> eV	<u>9.45</u> eV
Instruments for Detection	<u>X</u> PID w/ <u>10.6</u> Probe <u> </u> FID <u> </u> CGI <u> </u> RAD <u> </u> Det Tube <u>NIOSH 5503</u> Other <u>Lumex</u>	<u> </u> PID w/ <u> </u> Probe <u>X</u> FID <u> </u> CGI <u> </u> RAD <u> </u> Det Tube <u>X</u> pH Other <u>NIOSH 1003</u>	<u>X</u> PID w/ <u>10.6</u> Probe <u>X</u> FID <u>X</u> CGI <u> </u> RAD <u> </u> Det Tube <u> </u> pH Other <u>NIOSH 1022, 3800</u>

Control Measures

Site Map with Work Zones: To be determined



Work Zone Definitions:

Exclusion Zone - the area where contamination is either known or expected to occur and the greatest potential for exposure exists. The outer boundary of the Exclusion Zone, called the Hotline, separates the area of contamination from the rest of the site.

Contamination Reduction Zone (CRZ) - the area in which decontamination procedures take place. The purpose of the CRZ is to reduce the possibility that the Support Zone will become contaminated or affected by the site hazards.

Support Zone - the uncontaminated area where workers are unlikely to be exposed to hazardous substances or dangerous conditions. The Support Zone is the appropriate location for the command post, medical station, equipment and supply center, field laboratory, and any other administrative or support functions that are necessary to keep site operations running efficiently.

Communications:

- | | |
|---|--|
| <input checked="" type="checkbox"/> Buddy System | <input type="checkbox"/> Radio |
| <input type="checkbox"/> Air Horn for Emergencies | <input type="checkbox"/> Hand Signals/Visual Contact |

Personnel Decontamination Procedures:

- ☒ None
- ☐ Wet Decontamination (procedures as follows)
- ☐ Dry Decontamination (procedures as follows)

Equipment Decontamination Procedures:

- ☒ None
- ☐ Wet Decontamination (procedures as follows)
- ☐ Dry Decontamination (procedures as follows)

Adequacy of decontamination determined by: N/A

Personal Protective Equipment

TASK TO BE PERFORMED	ANTICIPATED LEVEL OF PROTECTION	TYPE OF CHEMICAL PROTECTIVE COVERALL	INNER GLOVE / OUTER GLOVE / BOOT COVER	APR CARTRIDGE TYPE or SCBA
Indoor Air Sampling	Level D	None	Nitrite Outer Gloves	None
Documentation	Level D	None	Nitrite Outer Gloves	None

Frequency and Types of Air Monitoring: Not Applicable

☐ Continuous

☐ Routine - _____

☐ Periodic - _____

DIRECT READING INSTRUMENTS	MultiRAE CGI / O ₂ / H ₂ S / CL ₂ / CO / PID	Ludlum 19 Micro-R Meter / Ludlum Model 3 Survey Meter	MicroFID or TVA-1000	Drager Chemical Detector Tube	Lumex Mercury Vapor Analyzer or Jerome 431X
EQUIPMENT ID NUMBER	N/A	N/A	N/A	N/A	N/A
CALIBRATION DATE	N/A	N/A	N/A	N/A	N/A
RST 2 PERSONNEL	N/A	N/A	N/A	N/A	N/A
ACTION LEVEL	<p>≥ 10 - 20% LEL (Confined Space / non- Confined Space)</p> <p>≤ 19.5% O₂ Deficient ≥ 23% O₂ - Enriched</p> <p>H₂S - PEL: 20 ppm IDLH: 100 ppm</p> <p>Cl₂ - PEL: 1 ppm IDLH: 10 ppm</p>	<p><3X Background Exercise Caution;</p> <p>≥ 1 mR/HR - Exit Area, Establish Perimeter, Contact RST 2 HSO</p>	<p>Unknowns:</p> <p>1 - 5 Units - "Level C"</p> <p>5-500 Units- "Level B"</p>	<p>PEL / TLV / IDLH: Compare with Drager Tube</p> <p>(See Chart Below)</p>	<p>Mercury Vapors (Except Organo Alkyls):</p> <p>PEL - 0.1 mg/m3 IDLH - 10 mg/m3</p>

NA: not applicable

Emergency Telephone Numbers

Emergency Contact	Location / Address	Telephone Number	Notified
Hospital: St. Mary's Hospital	350 Boulevard Passaic, NJ 07055	(973) 365-4300	No
Ambulance: Clifton Fire Department	900 Clifton Ave. Clifton, NJ	(973) 470-5801 or 911	No
Police: Clifton Police Department	900 Clifton Ave. Clifton, NJ	(973) 470-5900 or 911	No
Fire Department: Clifton Fire Department	900 Clifton Ave. Clifton, NJ	(973) 470-5801 or 911	No

Chemical Trauma Capability? ☒ Yes ☐ No

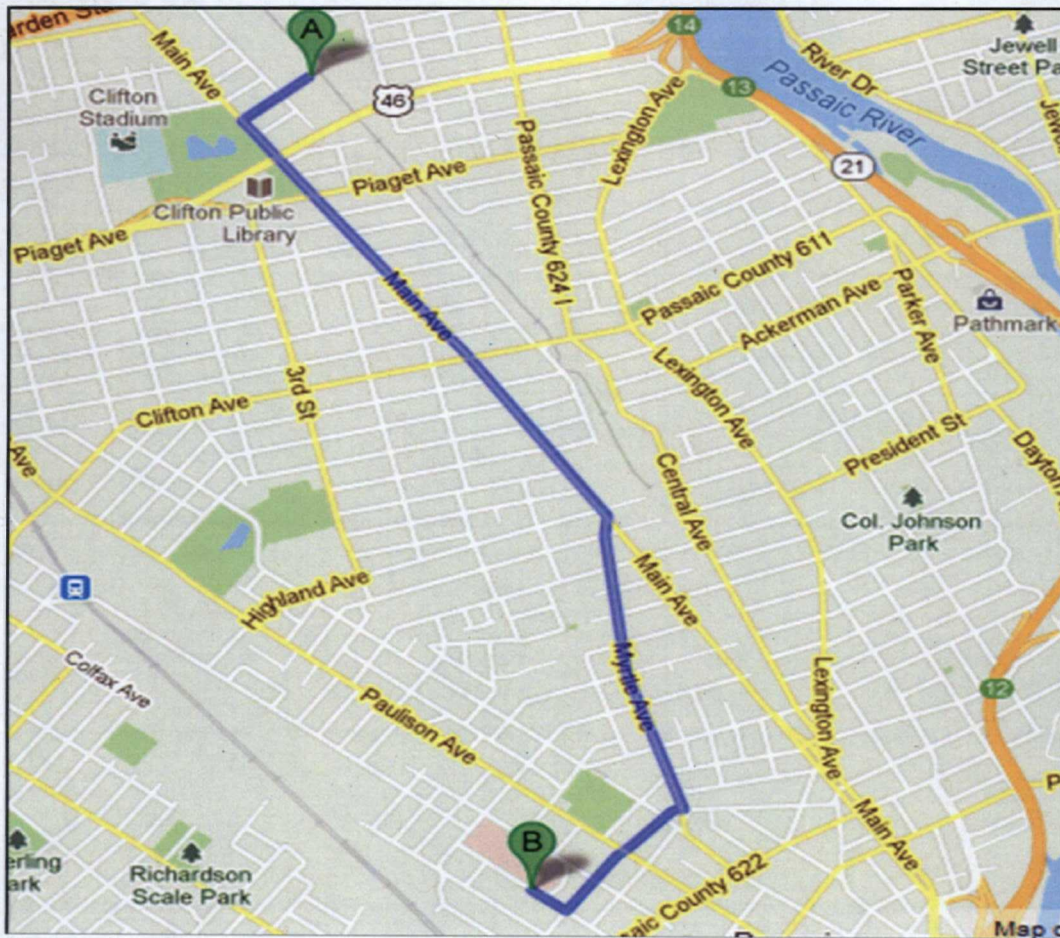
If no, closest backup: _____ Phone: _____

Directions to Hospital (Attach Color Map Following This Page): See color map on next page

- Head southwest on Wellington St. toward Getty Ave;
- Turn left onto Main Ave;
- Sight right onto Myrtle Ave;
- Turn right onto Howe Ave;
- Turn right onto Boulevard
- Arrive at St. Mary's Hospital at 350 Boulevard, Passaic NJ.

Total distance is 2.3 miles and travel time is about 9 minutes.

Route verified by: _____ Date: _____



*This map is subject to Google's Terms of Service, and Google is the owner of rights therein.
Portions of this image have been removed for clarity.*

Additional Emergency Telephone Contacts

<p>WESTON Medical Emergency Service Dr. Peter Greaney, Medical Director WorkCare 300 South Harbor Blvd, Suite 600 Anaheim, California 92805</p>	<p style="text-align: center;">800-455-6155 Regular Business Hours (9AM to 7:30PM) Dial 0 or Ext. 175 for Michelle Bui to request the on-call clinician. 800-455-6155 After Hours (Weekdays 7:31PM to 8:59AM, Weekends, Holidays) Dial 3 to reach the after-hours answering service. Request that the service connect you with the on-call clinician or the on-call clinician will return your call within 30 minutes.</p>
Chemtrec	800-424-9300
ATSDR	404-639-0615
ATF (explosives information)	800-424-9555
National Response Center	800-424-8802
National Poison Control Center	800-764-7661
Chemtel	800-255-3924
DOT	800-424-8802
CDC	800-232-0124

Pre-Response Approval

HASP prepared by: _____

Date: _____

Approval by: _____

Date: _____

Hazard Analysis

RISK LEVEL (High, Medium, Low)	HAZARD	RECOGNITION/ SYMPTOMS	MITIGATION	LEVEL OF PROTECTION
Low	Indoor Air Sampling (Slips, trips, and falls)	Poor illumination/unaware of surroundings	Aware of area and footing, walk in well lighted areas	Level D
Low	Documentation (Slips, trips, and falls)	Poor illumination/unaware of surroundings	Aware of area and footing, walk in well lighted areas	Level D

Hazardous Waste Site and Environmental Sampling Activities

Off Site: ☒ Yes ☐ No

On Site: ☐ Yes ☒ No

Describe types of samples and methods used to obtain samples:

Vapor intrusion samples, including sub-slab and indoor air, will be collected by RST at residential homes and a manufacturing facility adjacent to the site. Samples to be collected with Summa canisters and submitted for VOC laboratory analysis. RST 2 will document Site activities.

Was laboratory notified of potential hazard level of samples?

☒ Yes ☐ No

Note: The nature of the work assignment may require the use of the following procedures/programs which will be included as attachments to this HASP as applicable: Emergency Response Plan, Confined Space entry Procedures, Spill Containment Program.

Disclaimer: This Health and Safety Plan (HASP) was prepared for work to be conducted under the RST 2 Contract EP-W-06-072. Use of this HASP by WESTON and its subcontractors is intended to fulfill the OSHA requirements found in 29 CFR 1910.120. Items not specifically covered in this HASP are included by reference to 29 CFR 1910 and 1926.

The signatures below indicate that the individuals have read and understood this Health and Safety Plan.

PRINTED NAME	SIGNATURE	AFFILIATION	DATE
Bernard Nurosu	<i>Bernard Nurosu</i>	Weston RST 2	07-08-13
Aleksandra Mallon	<i>A. Mallon</i>	RST 2	7/8/13
<i>Pat H</i>	<i>Pat H</i>	RST 2	7/8/13
Maria Markoudakis	<i>Maria Markoudakis</i>	RST 2	7/17/13
Joel Petty	<i>Joel Petty</i>	RST 2	7/17/13
Mike Garibaldi	<i>Mike Garibaldi</i>	RST 2	7/22/13

Post-Response Approval

Final Submission of HASP by:		Date
Post Response Approval by:		Date
RST 2 HSO Review by:		Date

ATTACHMENT A:
NIOSH POCKET GUIDES



Centers for Disease Control and Prevention

CDC 24/7: Saving Lives. Protecting People.™

Search the Pocket Guide

SEARCH

Enter search terms separated by spaces.

Carbon tetrachloride

Synonyms & Trade Names Carbon chloride, Carbon tet, Freon® 10, Halon® 104, Tetrachloromethane

CAS No. 56-23-5

RTECS
No. FG4900000
([/niosh-rtecs/FG4AC4Ao.html](http://niosh-rtecs/FG4AC4Ao.html))DOT ID & Guide 1846 151 (<http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=151>) ☞
(<http://www.cdc.gov/Other/disclaimer.html>)Formula CCl₄Conversion 1 ppm =
6.29 mg/m³IDLH Ca [200 ppm]
See: 56235 ([/niosh/idlh/56235.html](http://niosh/idlh/56235.html))

Exposure Limits

NIOSH REL : Ca ST 2 ppm (12.6
mg/m³) [60-minute] See Appendix
A (nengapdxa.html)OSHA PEL † (nengapdxg.html) : TWA
10 ppm C 25 ppm 200 ppm (5-
minute maximum peak in any 4
hours)

Measurement Methods

NIOSH 1003 ☞ ([/niosh/docs/2003-154/pdfs/1003.pdf](http://niosh/docs/2003-154/pdfs/1003.pdf)) ;

OSHA 7

(<http://www.osha.gov/dts/sltc/methods/organic/org001/org001.html>)
☞ (<http://www.cdc.gov/Other/disclaimer.html>)See: NMAM ([/niosh/docs/2003-154/](http://niosh/docs/2003-154/)) or OSHA Methods
(<http://www.osha.gov/dts/sltc/methods/index.html>) ☞
(<http://www.cdc.gov/Other/disclaimer.html>)

Physical Description Colorless liquid with a characteristic ether-like odor.

MW:
153.8BP:
170°
FFRZ: -9°
F

Sol: 0.05%

VP: 91 mmHg

IP: 11.47 eV

Sp.Gr:
1.59FLP:
NA

UEL: NA

LEL: NA

Noncombustible Liquid

Incompatibilities & Reactivities Chemically-active metals such as sodium, potassium & magnesium; fluorine; aluminum [Note: Forms highly toxic phosgene gas when exposed to flames or welding arcs.]

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin; central nervous system depression; nausea, vomiting; liver, kidney injury; drowsiness, dizziness, incoordination; [potential occupational carcinogen]

Target Organs central nervous system, eyes, lungs, liver, kidneys, skin

Cancer Site [in animals: liver cancer]

Personal Protection/Sanitation (See
protection codes (protect.html))

Skin: Prevent skin contact

First Aid (See procedures (firstaid.html))

Eye: Irrigate immediately

Skin: Soap wash immediately

Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation
Provide: Eyewash, Quick drench

Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations

NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection ([pgintrod.html#mustread](#))

See also: INTRODUCTION ([/niosh/npg/pgintrod.html](#)) See ICSC CARD: 0024 ([/niosh/ipcsneng/neng0024.html](#)) See MEDICAL TESTS: 0041 ([/niosh/docs/2005-110/nmed0041.html](#))

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Content source: National Institute for Occupational Safety and Health (NIOSH) Education and Information Division

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SEARCH

Enter search terms separated by spaces.

Tetrachloroethylene

Synonyms & Trade Names Perchlorethylene, Perchloroethylene, Perk, Tetrachlorethylene

CAS No. 127-18-4

RTECS
No. KX3850000
([/niosh-rtecs/KX3ABF10.html](http://niosh-rtecs/KX3ABF10.html))

DOT ID & Guide 1897 160 (<http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=160>) ☞
(<http://www.cdc.gov/Other/disclaimer.html>)

Formula Cl₂C=CCl₂

Conversion 1 ppm =
6.78 mg/m³

IDLH Ca [150 ppm]
See: 127184 ([/niosh/idlh/127184.html](http://niosh/idlh/127184.html))

Exposure Limits

NIOSH REL : Ca Minimize workplace exposure concentrations. See Appendix A (nengapdxa.html)

OSHA PEL † (nengapdxg.html) : TWA 100 ppm

C 200 ppm (for 5 minutes in any 3-hour period), with a maximum peak of 300 ppm

Measurement Methods

NIOSH 1003 ☞ ([/niosh/docs/2003-154/pdfs/1003.pdf](http://niosh/docs/2003-154/pdfs/1003.pdf));

OSHA 1001

(<http://www.osha.gov/dts/sltc/methods/mdt/mdt1001/1001.html>)

☞ (<http://www.cdc.gov/Other/disclaimer.html>)

See: **NMAM** ([/niosh/docs/2003-154/](http://niosh/docs/2003-154/)) or **OSHA Methods**

(<http://www.osha.gov/dts/sltc/methods/index.html>) ☞

(<http://www.cdc.gov/Other/disclaimer.html>)

Physical Description Colorless liquid with a mild, chloroform-like odor.

MW:
165.8

BP:
250°F

FRZ: -2°
F

Sol: 0.02%

VP: 14 mmHg

IP: 9.32 eV

Sp.Gr:
1.62

FLP:
NA

UEL:
NA

LEL: NA

Noncombustible Liquid, but decomposes in a fire to hydrogen chloride and phosgene.

Incompatibilities & Reactivities Strong oxidizers; chemically-active metals such as lithium, beryllium & barium; caustic soda; sodium hydroxide; potash

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, liver, kidneys, central nervous system

Cancer Site [in animals: liver tumors]

Personal Protection/Sanitation (See protection codes (protect.html))

First Aid (See procedures (firstaid.html))

Eye: Irrigate immediately

Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation
Provide: Eyewash, Quick drench

Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations

NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection (pgintrod.html#mustread)

See also: [INTRODUCTION \(/niosh/npg/pgintrod.html\)](http://niosh/npg/pgintrod.html) See ICSC CARD: [0076 \(/niosh/ipcsneng/neng0076.html\)](http://niosh/ipcsneng/neng0076.html) See MEDICAL TESTS: [0179 \(/niosh/docs/2005-110/nmed0179.html\)](http://niosh/docs/2005-110/nmed0179.html)

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SEARCH

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Trichloroethylene					
Synonyms & Trade Names Ethylene trichloride, TCE, Trichloroethene, Trilene					
CAS No. 79-01-6		RTECS No. <u>KX4550000</u> (<u>/niosh-rtecs/KX456D70.html</u>)		DOT ID & Guide 1710 160 (<u>http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=160</u>) ☞ (<u>http://www.cdc.gov/Other/disclaimer.html</u>)	
Formula ClCH=CCl ₂		Conversion 1 ppm = 5.37 mg/m ³		IDLH Ca [1000 ppm] See: <u>79016</u> (<u>/niosh/idlh/79016.html</u>)	
Exposure Limits NIOSH REL : Ca See <u>Appendix A</u> (<u>nengapdx.html</u>) See <u>Appendix C</u> (<u>nengapdx.html</u>) OSHA PEL † (<u>nengapdxg.html</u>) : TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 2 hours)				Measurement Methods NIOSH 1022 ☞ (<u>/niosh/docs/2003-154/pdfs/1022.pdf</u>), 3800 ☞ (<u>/niosh/docs/2003-154/pdfs/3800.pdf</u>); OSHA 1001 (<u>http://www.osha.gov/dts/sltc/methods/mdt/mdt1001/1001.html</u>) ☞ (<u>http://www.cdc.gov/Other/disclaimer.html</u>) See: <u>NMAM</u> (<u>/niosh/docs/2003-154/</u>) or <u>OSHA Methods</u> (<u>http://www.osha.gov/dts/sltc/methods/index.html</u>) ☞ (<u>http://www.cdc.gov/Other/disclaimer.html</u>)	
Physical Description Colorless liquid (unless dyed blue) with a chloroform-like odor.					
MW: 131.4	BP: 189°F	FRZ: -99° F	Sol: 0.1%	vp: 58 mmHg	IP: 9.45 eV
Sp.Gr: 1.46	FLP: ?	UEL(77° F): 10.5%	LEL(77° F): 8%		
Combustible Liquid, but burns with difficulty.					
Incompatibilities & Reactivities Strong caustics & alkalis; chemically-active metals (such as barium, lithium, sodium, magnesium, titanium & beryllium)					
Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact					
Symptoms irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen]					
Target Organs Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system					
Cancer Site [in animals: liver & kidney cancer]					
Personal Protection/Sanitation (See <u>protection codes</u> (<u>protect.html</u>)) Skin: Prevent skin contact				First Aid (See <u>procedures</u> (<u>firstaid.html</u>)) Eye: Irrigate immediately Skin: Soap wash promptly	

Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation
Provide: Eyewash, Quick drench

Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations

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(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister

Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection ([pgintrod.html#mustread](#))

See also: INTRODUCTION ([/niosh/npg/pgintrod.html](#)) See ICSC CARD: 0081 ([/niosh/ipcsneng/neng0081.html](#)) See MEDICAL TESTS: 0236 ([/niosh/docs/2005-110/nmed0236.html](#))

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ATTACHMENT B:

WESTON FLDS

FLD 02 INCLEMENT WEATHER

Hot weather (ambient temperatures over 70°F), cold weather (ambient temperatures below 40°F), rain, snow, ice, and lightning are examples of inclement weather that may be hazardous or add risk to work activities. Extremes of heat, cold, and humidity, as well as rain, snow, and ice, can adversely affect monitoring instrument response and reliability, respiratory protection performance, and chemical protective clothing materials.

RELATED FLDs AND OP

FLD 05 – Heat Stress Prevention and Monitoring

FLD 06 – Cold Stress

OP 05-03-008 – Inclement Weather & Business Disruption Policy

PROCEDURE

The potential for exacerbating the impact of physical hazards must be considered for tasks that expose personnel to inclement weather. Risk assessment and hazards analysis should be accomplished during the planning stages of a project for the most likely inclement weather conditions that may be encountered, i.e., rain and lightning in late spring, summer, and early fall, or lightning prone areas; cold, snow, and ice in winter. The Field Safety Officer (FSO) must determine the proper safety procedures and recommend them to the site manager. Each worker must evaluate the risk associated with his/her work and be actively alert to these hazards. Managers and workers must be familiar with the requirements of FLD 05 and FLD 06.

A pre-site activity risk assessment must be completed when inclement weather occurs. Weather conditions that affect instruments and personal protective equipment (PPE) function must be conveyed to site workers who should monitor function and integrity of PPE and be alert to changing weather conditions. A decision must be made on the proper safety procedures to use if work must continue, or to stop work if the risk is too great. The appropriate Safety Professional **must be notified of all instances of the need to stop work for safety reasons, including inclement weather.**

Heat

Hot, dry weather increases risk of soil drying, erosion, and dust dispersion, which may present or increase risk of exposure and environmental impact from toxic hazards. Hot weather will increase pressure on closed containers and the rate of volatilization, thereby potentially increasing the risk of exposure to toxic, flammable, or explosive atmospheres.

Prevention and Protective Measures

Employees must be protected from airborne contaminants using engineering controls such as wetting dry soil to prevent particle dispersion, and providing local ventilation to reduce volatile air contaminants to safe levels, or if engineering controls are infeasible, using prescribed PPE. Wind shifts and velocity should be measured where change may result in dispersion of airborne contaminants into the work area.

Rain, Wet Weather, and High Humidity

Wet conditions resulting from rain and wet weather increase slipping and tripping hazards, braking distances of vehicles, the potential for vehicle skidding, or difficulties in handling powered devices such as augers and drills. Rain fills holes, obscures trip and fall hazards, and increases risk of electrical shock

when working with electrical equipment. Changes in soil conditions caused by rain can impact trenching and excavating activities, creating the potential for quicksand formation, wall collapse, and cave-in. Vehicles become stuck in mud, and tools and personnel can slip on wet surfaces. Rain and wet conditions may decrease visibility (especially for personnel wearing respiratory protection) and limit the effectiveness of certain direct-reading instruments (e.g., photoionization detectors [PIDs]).

Feet that become wet and are allowed to remain wet can lead to serious problems under both heat and cold conditions. Activities that may result in wet feet include extended work in chemical protective clothing and wading in water/liquid during biological assessments. Trench foot, paddy foot, and immersion foot are terms associated with foot ailments resulting from feet being wet for long periods of time. All have similar symptoms and effects. Initial symptoms include edema (swelling), tingling, itching, and severe pain. These may be followed by more severe symptoms including blistering, death of skin tissue, and ulceration. (NOTE: The following Preventive and Protective Measures also apply to Cold, Snow, and Ice.)

Preventive and Protective Measures

Walkways, stairs, ladders, elevated workplaces, and scaffold platforms must be kept free of mud, ice, and snow. Employees shall be prohibited from working on scaffolds covered with snow, ice, or other slippery material except as necessary for removal of such materials.

Vehicles used in rain or cold weather must have working windshield wipers and defrosters, and windows must be kept clear of obstruction.

Drivers must observe traffic laws, including maintaining speed within limits safe for weather conditions, and wearing seat belts at all times. Note that this may mean operating below the posted speed limit.

When walking, workers should use a walking stick or probe to test footing ahead where there is standing water, snow, or ice to protect the walker against stepping into potholes or onto puncture hazards, buried containers, or other potential structurally unsound surfaces.

Prior to using vehicles or equipment in off-road work, workers should walk the work area or intended travelway when puddles or snow may obscure potholes, puncture hazards, or buried containers, or other potential structurally unsound surfaces.

Project managers should arrange to have winches, come-alongs, or other mechanical assistance available when vehicles are used in areas where there is increased risk of getting stuck. Cable or rope and mechanical equipment used for pulling stuck vehicles must be designed for the purpose, of sufficient capacity for the load, and be inspected regularly and before use to ensure safety. **Manually pushing stuck vehicles is to be avoided.**

Prevention methods are required when work is performed in wet conditions or when conditions result in sweating, causing the feet to become and remain wet. Proper hygiene is critical. Workers must dry their feet and change socks regularly to avoid conditions associated with wet feet. Use of foot talc or powder can additionally assist in prevention of this type of condition.

Cold, Snow, and Ice

Cold weather affects vehicle operation by increasing difficulty in starting and braking. Ice, frost, and snow can accumulate on windows and reduce vision. Cold, wet weather can cause icing of roadways,

driveways, parking areas, general work places, ladders, stairs, and platforms. Ice is not always as obvious to see as snow or rain, and requires special attention, especially when driving or walking.

Snow and ice increase the risk of accidents such as slipping when walking, climbing steps and ladders, or working at elevation, and the risk of accidents when driving vehicles or operating heavy equipment. Heavy snow and ice storms may cause electric lines to sag or break, and the use of electrical equipment in snow increases the risk of electric shock. Snow can hide potholes and mud, which can result in vehicles getting stuck or persons falling when stepping into hidden holes. Snow also may cover water, drums or other containers, sharp metal objects, debris, or other objects that can cause falls or punctures.

Preventive and Protective Measures

WESTON personnel are cautioned against operating motor vehicles such as cars or trucks on ice under any circumstances. If traveling in icy conditions, WESTON personnel should follow all public service advisories that curtail driving activities.

Personnel performing activities that require working over ice should be aware of minimal ice thickness safety guidelines as follows:

- 4-inch minimum: activities such as walking or skating.
- 6-inch minimum: activities such as snowmobiling or the use of equipment with the same weight and cross-sectional area as a snowmobile.

Personnel should always be aware that these measurement guidelines are under ideal conditions and that snow cover, conditions on rivers, ponds, or lakes with active currents, and other environmental factors impact the safety of working on ice. Clear ice typically is the strongest, while ice that appears cloudy or honeycombed (contains entrained air) is not as structurally strong. Measurements made by drilling or cutting through the ice should be made every few feet to verify safe conditions. Provisions for rescue (e.g., ladders or long poles and effective communications) must be available at the work site.

Lightning

Lightning represents a hazard of electrical shock that is increased when working in flat open spaces, elevated work places, or near tall structures or equipment such as stacks, radio towers, and drill rigs. Lightning has caused chemical storage tank fires and grass or forest fires. Static charges associated with nearby electrical storms can increase risk of fire or explosion when working around flammable materials, and can adversely affect monitoring instruments.

Lightning is the most dangerous and frequently encountered weather hazard people experience each year. Lightning affects all regions. **Florida, Michigan, Pennsylvania, North Carolina, New York, Ohio, Texas, Tennessee, Georgia, and Colorado** have the most lightning deaths and injuries.

Preventive and Protective Measures

Prior to working in areas or beginning projects when or where there is an increased potential for lightning striking personnel, steps must be taken to predict the occurrence of lightning strikes. Recommendations include:

- Check with client management to determine if there are any patterns or noted conditions that can help predict lightning or if there are structures that are prone to lightning strikes. Arrange for

client notification when there is increased potential for lightning activities. Ensure that clients include WESTON workers in lightning contingency plans.

- Monitor weather reports.
- Note weather changes and conditions that produce lightning.
- Stop work in open areas, around drill rigs or other structures that may attract lightning, on or in water and in elevated work places when lightning strikes are sighted or thunder is heard near a work site.
- Ensure all personnel are provided with safe areas of refuge. Prevent personnel from standing in open areas, under lone trees, or under drill rigs.
- Observe the "30-30" Rule. If you see lightning and thunder is heard within 30 seconds (approximately 6 miles), seek shelter. If you hear thunder, but did not see the lightning, you can assume that lightning is within 6 miles and you should seek shelter. Remain in the sheltered location for 30 minutes following the last lightning strike.
- Use a hand held static potential meter (lightning detection device) to monitor the potential difference between a cloud and the ground. When the measured potential is greater than 2 kV/m, there is a potential for a lightning strike – seek shelter.

High Wind and Tornado Safety

High Winds

Many construction workers have died due to wind-related accidents and injuries. A ladder that seems secure under normal circumstances can become unstable during windy conditions and cause you to fall. Scaffolding that is improperly secured can rip free during strong winds and kill bystanders. The risk of injury for construction workers increases during strong winds. Keep in mind that changing weather conditions can affect your daily work tasks, and make sure you have a game plan to prevent proper damage and personal injury.

Stay Informed: With today's modern technology available at the touch of a button, you should keep up to date with the latest local weather reports. Visit weatherbug.com or weather.gov to stay informed in case of wind warnings, watches, and advisories. Larger projects may have their own weather station on site to provide instant weather data. Use daily hazard assessments to determine if working conditions have changed or will change throughout the day.

Be Prepared: When you know the weather will be windy, secure loose building materials, scaffolding and fencing that could be picked up or torn loose by strong winds and thrown onto surrounding streets, structures, vehicles, or bystanders.

Know the Limits of Your Equipment: When operating any equipment, take time to read the operator's manual and become familiar with the wind specifications. Many crane manufacturers have high-wind guidelines to prevent you from operating a crane in unsafe weather. You should also check safety equipment such as fall protection to determine if it is adequate for windy conditions.

Know the Terminology

Severe Thunderstorm Watch

A Severe Thunderstorm Watch means that strong thunderstorms capable of producing winds of 58 mph or higher and/or hail 3/4 inches in diameter or larger are possible. If you are in the area of a Severe Thunderstorm Watch, you should be prepared to take shelter from thunderstorms. Severe Thunderstorm Watches are generally issued for 6-hour periods.

Severe Thunderstorm Warning

A Severe Thunderstorm Warning means that thunderstorms capable of strong winds and/or large hail are occurring or could form at any time. If you are in the area of a severe thunderstorm, you should take shelter indoors immediately, avoid windows, and be prepared for high winds and hail. Severe Thunderstorm Warnings are generally in effect for an hour or less.

High Wind Watch

A High Wind Watch is issued when sustained winds exceeding 40 mph and/or frequent gusts over 60 mph are likely to develop in the next 24 to 48 hours. For summit areas, high wind watches are issued when sustained winds are expected to exceed 45 mph and/or frequently gust over 60 mph. If you are in an area for which a High Wind Watch has been issued you should secure loose objects outdoors that may blow about and avoid outdoor activity that exposes you to high winds.

High Wind Warning

A High Wind Warning is issued when sustained winds exceeding 40 mph and/or frequent gusts over 60 mph are occurring or imminent. For summit areas, warnings are issued for winds exceeding 45 mph and/or frequently gusting over 60 mph. Wind warnings may be issued up to 24 hours ahead of the onset of high winds and remain in effect for 6 to 12 hours. If you are in an area where a high wind warning is in effect you should avoid activities that expose you to high winds. Loose objects may be blown around. Tree limbs may break and fall. Power lines may be blown down.

Wind Advisory

A Wind Advisory is issued when sustained winds of 30 to 39 mph and/or frequent gusts to 50 mph or greater are occurring or imminent. Wind advisories may be in effect for 6 to 12 hours. If you are in an area where a wind advisory is in effect you should secure loose objects that may be blown about outdoors and limit activity that may expose you to high winds.

Work Safely: If you will be working on a windy day, you should be alert and protected. Wear eye protection to prevent dust and other particles from entering or striking your eyes. Keep your hard hat on at all times to prevent injuries from falling or flying objects. The likelihood of falls from heights is greatly increased by strong winds. Wear the necessary PPE to ensure your safety.

To avoid flying debris and to minimize damage during high winds:

- Shut down outdoor activities involving work at elevation on ladders, scaffolding, aerial lifts, etc.; handling large tarps and plastic sheeting when wind speeds exceed 25 mph; including work with radioactive materials and highly toxic materials that could be dispersed by the winds.
- At 13 - 18 mph wind will raise dust. Follow the dust action level.

- Move mobile items stored outside to indoor storage.
- Secure any items that cannot be moved inside.
- Be careful opening exterior doors.
- Be cautious about downed power lines, tree limbs, and debris on roads.
- Be alert for animals who have escaped from farms and zoos.

Stay Away from Power Lines: High winds can cause tree limbs to fall on power lines resulting in electrocution hazards or loss of power. Your best bet is to keep your distance.

Tornados

What is a TORNADO?

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud. It is spawned by a thunderstorm or as a result of severe weather associated with hurricanes. A funnel cloud is formed as cool air overrides a layer of warm air, forcing the warm air to rise rapidly. The damage from a tornado results from high wind velocity and wind blown debris.

Tornado Safety

When a tornado approaches, you have only a brief amount of time to make life-or-death decisions. Advance planning and quick response are the keys to surviving a tornado.

Purchase a NOAA Weather Alert radio with an alert feature. When tuned to the proper frequency, these weather radios remain silent until a weather emergency occurs. Once they pick up the alarm tone, they will begin broadcasting emergency weather information so that citizens can protect themselves and their property. Some models of the NOAA weather radio incorporate the Specific Area Message Encoder technology, allowing users to target only those warnings that affect their immediate geographic area.

Conduct tornado drills. Designate an area to serve as your safe area, and practice having team members assemble there in response to a mock tornado warning.

Emergency Communications Plan. Develop an emergency communications plan in case team members are separated from one another when a tornado warning goes into effect. Designate an emergency coordinator. Instruct everyone to contact this coordinator in a weather emergency for instructions on what to do during the storm and where to reassemble after the emergency has passed. Design contingency plans to be consistent with client contingency plans. When possible use client warning and alerting systems and confirm that team members have access to shelters and know how to get to them.

Know the Difference between a Tornado Watch and a Tornado Warning

Tornado Watch: Issued by the National Weather Service when tornadoes are possible in your area. You should remain alert for approaching storms. Remind family members of where the safe areas are within your home, and carefully monitor radio or television reports for further developments.

Tornado Warning: Indicates that a tornado has been sighted in your area, or is indicated on weather radar. You should proceed to safe shelter immediately.

When A Tornado Warning Goes In Effect, Put Your Safety Plans In Action.

In Your Automobile: Motor vehicles are easily overturned by tornado winds. Leave your vehicle and seek shelter in a sturdy building. As a last resort, seek shelter in a ditch or culvert. Do not try to outrun or outmaneuver a tornado! Use the time to seek appropriate shelter outside your vehicle.

Office Buildings, Hotels, and Shopping Centers: Take shelter in an interior hallway on a lower floor. A closet, bathroom or other small room with short, stout walls will give some protection from collapse and flying debris. Otherwise, get under heavy furniture and stay away from windows. Many tornado deaths have occurred in large buildings due to the collapse of a roof or wide span wall. A corner area, away from a window, is safer than the middle of a wide span wall.

Out In Open Country: When severe weather approaches, seek inside shelter immediately. The chances of encountering falling trees, downed power lines and lightning are far greater than encountering a tornado itself. If a tornado approaches, lie flat in the nearest depression, such as a culvert or ditch, and cover your head with your arms.

BE ALERT TO CHANGING WEATHER CONDITIONS

HAVE AN EMERGENCY WEATHER PLAN IN PLACE

REHEARSE YOUR CONTINGENCY PLANS PERIODICALLY

KNOW WHERE TO GO WHEN A TORNADO THREATENS.

FLD 05 HEAT STRESS PREVENTION AND MONITORING

Heat stress may occur at any time work is performed at elevated temperatures. If the body's physiological processes fail to maintain a normal body temperature because of excessive heat, a number of physical reactions can occur such as fatigue, irritability, anxiety, and decreased concentration or dexterity, and possibly death. Because heat stress is one of the most common and potentially serious illnesses at field sites, regular monitoring and other preventive measures are vital to ensure worker safety. Wearing chemical protective clothing often decreases natural body heat loss (cooling) and increases the risk of heat stress.

Employees who are taking prescription or over-the-counter medications should consult with their personal physician prior to working in high-temperature environments to see if their medication would impair their ability to handle heat stress.

REFERENCES

OSHA 29 CFR 1910 and 1926

RELATED FLDs

FLD 02 – Inclement Weather

FLD 03 – Hot Processes – Steam, Low Temperature Thermal Treatment Unit, and Transportable Incinerator

FLD 08 – Confined Space Entry Program

FLD 36 – Welding/Cutting/Brazing/Radiography

FLD 37 – Pressure Washers/Sandblasting

PROCEDURE

Heat Stress Symptoms and Treatment

Heat Rash

Heat rash, also known as prickly heat, may occur in hot and humid environments where sweat is not easily removed from the surface of the skin by evaporation and is aggravated by chafing clothes. When extensive or complicated by infection, heat rash can be so uncomfortable that it inhibits sleep and impairs a worker's performance.

Symptoms – Mild red rash, especially in areas of the body that come into contact with protective gear.

Treatment – Decrease amount of time spent working in protective gear and provide body powder to help absorb moisture and decrease chafing. Heat rash can be prevented by showering, resting in a cool place, and allowing the skin to dry.

Heat Cramps

Heat cramps are caused by inadequate electrolyte intake. The individual may be receiving adequate water; however, if not combined with an adequate supply of electrolytes, the blood can thin to the point where it seeps into the active muscle tissue, causing cramping.

Symptoms – Acute painful spasms of voluntary muscles, most notably the abdomen and extremities.

Treatment – Move the victim to a cool area and loosen clothing. Have the victim drink 1 to 2 cups of cool potable water or diluted commercial electrolyte solution (e.g., Gatorade, Quench) immediately, and then every 20 minutes thereafter until symptoms subside. Electrolyte supplements can enhance recovery; however, it is best to double the amount of water required by the dry mix package directions or add water to the liquid form.

Heat Exhaustion

Heat exhaustion is a state of weakness or exhaustion caused by the loss of fluids from the body. Heat exhaustion is not as dangerous as heat stroke, but if not properly managed in the field it may lead to heat stroke.

Symptoms – Pale, clammy, and moist skin, profuse perspiring, and extreme weakness. Body temperature is normal, pulse is weak and rapid, and breathing is shallow. The person may have a headache, may vomit, may feel dizzy, and may be irritable or confused.

Treatment – Move the victim to a cool, air-conditioned or temperature-controlled area, loosen clothing, place in a position with the head lower than the feet (shock prevention), and allow the victim to rest. Consult a physician. Ensure that the victim is not nauseated or vomiting. If not nauseated or vomiting, give the victim small sips of cool water or diluted electrolyte replenishment solution (one to one dilution with water, or if mixing from powder, double the water added). If this is tolerated, have the victim drink 1 to 2 cups of fluid immediately, and every 20 minutes thereafter until symptoms subside. Seek medical attention at the advice of the consulting physician.

Heat Stroke

Heat stroke is an acute and dangerous reaction to heat stress caused by a failure of the body's heat regulating mechanisms, i.e., the individual's temperature control system (sweating) stops working correctly. Body temperature rises so high that brain damage and death may result if the person is not cooled quickly.

Symptoms – Red, hot, dry skin (although the person may have been sweating earlier); nausea, dizziness, confusion, extremely high body temperature (i.e., 104°F or greater as measured with an oral thermometer), rapid respiratory and pulse rate, seizures or convulsions, unconsciousness or coma.

Treatment – Immediately call for emergency medical assistance. Remove the victim from the source of heat and cool the victim quickly. If the body temperature is not brought down quickly, permanent brain damage or death may result. Remove all PPE and as much personal clothing as decency permits. Fan the person while sponging or spraying with cool or tepid water. Apply ice packs (if available) to the back of the neck, armpits, groin area, or behind the knees. Place the victim flat on their back or with head and shoulders slightly elevated. If conscious, and not nauseated or vomiting, the victim may be provided sips of cool water. Do not give the victim coffee, tea, or alcoholic beverages. Emergency medical personnel will take over treatment when they arrive.

Recognition and Risk Assessment

In the planning stages of a project, the potential for heat stress disorders must be considered as a physical hazard in the site-specific Health and Safety Plan (HASP). Risk assessment can be accomplished in the development stages of a project by listing in the HASP the most likely heat stress disorders that may occur. The Field Safety Officer (FSO) must make decisions on the proper safety procedures and recommend them to the site manager. Each worker must evaluate the risk associated with his or her work and be actively alert to these hazards. Any site worker may stop work if safety procedures are not

followed or the risk is too great. In addition, all site personnel must be aware of these symptoms in both themselves and their co-workers.

Prevention and Protection Programs

Heat stress is affected by several interacting factors including, but not limited to, age, obesity, physical condition, substance abuse, level of personal protective equipment (PPE) worn, and environmental conditions (temperature, shade, and humidity). Site workers must learn to recognize and treat the various forms of heat stress. The following recommendations should be followed to prevent heat stress:

- The most important measure to prevent heat-related illness is adequate fluid intake. Workers should drink 1/2 to 1 quarts of liquids per hour in high heat conditions. Most of this liquid should be water. Under heavy work and heat conditions, the body may lose up to 2 gallons of fluids per day. To prevent heat stress symptoms, the individual must ensure replacement of this fluid.
- Provide disposable cups that hold about 4 ounces, and water that is maintained at 50 to 60°F. Workers should drink 16 ounces of water before beginning work, and a cup or two at each break period.
- Provide a shaded area for rest breaks. Ensure that adequate shelter is available to protect personnel against heat and direct sunlight. When possible, shade the work area.
- Discourage the intake of caffeinated drinks during working hours.
- Monitor for signs of heat stress.
- Encourage workers to maintain a good diet during these periods. In most cases, a balanced diet and lightly salted foods should help maintain the body's electrolyte balance. Bananas are especially good for maintaining the body's potassium level.
- If utilizing commercial electrolyte mixes, double the amount of water called for in the package directions. Indications are that "full-strength" preparations taken under high heat stress conditions may actually decrease the body's electrolytes.
- Acclimate workers to site work conditions by slowly increasing workloads (i.e., do not begin work activities with extremely demanding tasks).
- Rotate shifts of workers who are required to wear impervious clothing in hot weather.
- Encourage workers to wear lightweight, light-colored, loose-fitting clothing.
- In extremely hot weather, conduct field activities in the early morning and evening.
- Provide cooling devices to aid natural body heat regulation. These devices, however, add weight and their use should be balanced against worker efficiency. An example of a cooling aid is long cotton underwear, which acts as a wick to absorb moisture and protect the skin from direct contact with heat-absorbing protective clothing.
- Good hygienic standards must be maintained by frequent showering and changes of clothing.
- Clothing should be permitted to dry during rest periods.
- Whenever working in the sun, provide employees with sunscreen with both UVA and UVB protection.
- Persons who notice skin problems should immediately consult medical personnel.

Heat Stress Monitoring and Work Cycle Management

When strenuous field activities are part of on-going site work conducted in hot weather, the following guidelines should be used to monitor the body's physiological response to heat, and to manage the work cycle, even if workers are not wearing impervious clothing. These procedures should be instituted when the temperature exceeds 70°F and the tasks/risk analysis indicates an increased risk of heat stress problems. Consult the HASP and a safety professional (e.g., Division EHS Manager, FSO) if questions arise as to the need for specific heat stress monitoring. In all cases, the site personnel must be aware of the signs and symptoms of heat stress and provide adequate rest breaks and proper aid as necessary.

Measure Heart Rate – Heart rate should be measured by the radial pulse for 30 seconds as early as possible in the rest period. The heart rate at the beginning of the rest period should not exceed 110 beats per minute. If the heart rate is higher, the next work period should be shortened by 33%, while the length of the rest period stays the same. If the pulse rate still exceeds 110 beats per minute at the beginning of the next rest period, the following work cycle should be further shortened by 33%. The procedure is continued until the rate is maintained below 110 beats per minute.

Measure Body Temperature – When ambient temperatures are over 90°F, body temperatures should be measured with a clinical thermometer as early as possible in the rest period. If the oral temperature exceeds 99.6°F (or 1 degree change from baseline) at the beginning of the rest period, the following work cycle should be shortened by 33%. The procedure is continued until the body temperature is maintained below 99.6°F (or 1 degree change from baseline). Under no circumstances should a worker be allowed to work if their oral temperature exceeds 100.6°F.

Measure Body Water Loss – Body water loss greater than 1.5% of total body weight is indicative of a heat stress condition. Body weight is measured before PPE is donned and after the PPE is removed following a work cycle. Body water loss can be measured with an ordinary bathroom scale; however, the scale must be sensitive to one-half pounds increments. A worker is required to drink additional fluids and rest if their body water loss is greater than 1.5%.

NOTE: For purposes of this operating practice, a break is defined as a 15-minute period and/or until an individual's vital signs are within prescribed guidelines.

A physiological monitoring schedule is determined by following the steps below:

- Measure the air temperature with a standard thermometer.
- Estimate the fraction of sunshine by judging what percent the sun is out (refer to Table 1).
- Calculate the adjusted temperature based on the following formula:
$$\text{Adjusted Temperature} = \text{Actual Temperature} + 13 \times X \text{ (where } X = \text{sunshine fraction from Table 1)}$$
- Using Table 2, determine the physiological monitoring schedule for fit and acclimated workers for the calculated adjusted temperature.

The length of work period is governed by frequency of physiological monitoring (Table 2). The length of the rest period is governed by physiological parameters (heart rate and oral temperature).

**Table 1. Percent Sunshine Factors
Heat Stress Prevention and Monitoring**

Percent Sunshine (%)	Cloud Cover	Sunshine fraction
100	No cloud cover	1.0
50	50% cloud cover	0.5
0	Full cloud cover	0.0

**Table 2. Physiological Monitoring Schedule
Heat Stress Prevention and Monitoring**

Adjusted Temperature	Level D (Permeable clothing)	Level C, B, or A (Nonpermeable clothing)
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°F (30.8° - 32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5° - 87.5°F (28.1° - 32.2°C)	After each 90 minutes of work	After each 60 minutes of work
77.5° - 82.5°F (25.3° - 28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5° - 77.5°F (22.5° - 25.3°C)	After each 150 minutes of work	After each 120 minutes of work

Example: Site personnel anticipate wearing level C (impermeable clothing) during site activities. The air temperature is 80°F and there are no clouds in the sky (100% sunshine). The adjusted temperature is calculated in the following manner:

$$\text{Adjusted Temperature (Adj T } ^\circ\text{F)} = \text{Actual Temperature (Amb T } ^\circ\text{F)} + (13 \times \text{sunshine fraction})$$

$$\text{Adj T } ^\circ\text{F} = 80^\circ\text{F} + (13 \times 1.0)$$

$$\text{Adj T } ^\circ\text{F} = 93^\circ\text{F}$$

Using Table 2, the pulse rate, oral temperature and body water loss monitoring would be conducted after each 15 minutes of work. The adjusted temperature may need to be redetermined if the percent sunshine and ambient temperature changes drastically during site work.

If an individual's heart rate exceeds 110 beats per minute at the beginning of the rest period, that individual will continue to rest until his or her heart rate drops to baseline; the next work period is then decreased by 33%.

FLD 11 ROUGH TERRAIN/ATV USE

RELATED FLDs

FLD 02 – Inclement Weather

FLD 05 – Heat Stress Prevention and Monitoring

FLD 06 – Cold Stress

FLD 22 – Heavy Equipment Operation

FLD 47 – Clearing, Grubbing, and Logging Operations

FLD 57 – Motor Vehicle Safety

HAZARD

Physical hazards associated with rough terrain include vehicle accidents, heavy equipment incidents, falling, slipping, and tripping.

Driving vehicles on uneven surfaces creates a possibility of the vehicle rolling, getting stuck in mud or ditches, or of an accident due to flat tires or striking obstacles and other vehicles.

When working on foot, steep inclines and heavy or downed vegetation can hide holes or breaks in the terrain, increasing the risk of slips, trips, and falls.

RECOGNITION AND RISK ASSESSMENT

Rough terrain complicates work activities and adds to or increases risk. In the planning stages of a project, rough terrain must be considered as a physical hazard and identified in the site-specific health and safety plan (HASP). Risk assessment is usually accomplished from site history information (i.e., site topography) and on site by the Field Safety Officer (FSO).

HAZARD PREVENTION AND PROTECTION PROGRAMS

Safety on Foot

Personnel working on rough terrain should maintain a high level of physical conditioning due to increased body stress and exertion.

The site crew should be alert and observe terrain while walking to minimize slips, trips, and falls.

Boots should be ankle high or higher to provide additional support and stability.

Work will be completed in adequate natural light or sufficient illumination will be maintained.

Site personnel will conduct an initial walkover and the “buddy system” will be implemented.

Emergency communications such as a cell phone or two-way radio should be carried at all times.

Personnel should be aware of potential hazards and ensure the availability of first-aid supplies and knowledge of the location of the nearest medical assistance.

VEHICLE SAFETY

Vehicle drivers and passengers will wear seatbelts at all times.

Hazards can be prevented by ensuring regular maintenance is performed on vehicles and all safety features are working. Have brakes and wheel bearings of vehicles used off road or in four wheel drive inspected at increased frequency (suggest inspections at twice the manufacturer's recommended frequency).

In order to minimize accidents, site surveillance on foot may be required to ensure clear driving paths.

Minimize side hill travel. Travel straight up and down hills whenever possible. Passengers will not be allowed when side hill travel is required.

Take into account loads or superstructure of vehicles which raise the center of gravity and increase risk of tipping.

Cross streams, small logs or other passable (there is adequate clearance of the undercarriage) obstructions at right angles.

Four wheel drive vehicles should be used if terrain conditions are wet, frozen, broken, or otherwise deemed unsafe for two wheel drive vehicles by the FSO. Use of vehicles off-road will be specifically addressed in the HASP and personnel operating vehicles will be checked for proficiency.

- Before moving a vehicle in the field, first walk the route of travel, inspecting for depressions, stumps, gullies, ruts, and similar obstacles.
- Always check the brakes of a vehicle before traveling, particularly on rough, uneven, or hilly ground.
- Check the complete drive train of a carrier at least weekly for loose or damaged bolts, nuts, studs, shafts, and mountings.
- Engage the all wheel drive when traveling off highway on hilly terrain.
- Increase tire pressures before traveling in hilly terrain (do not exceed rated tire pressure).
- Use the assistance of someone on the ground as a guide when lateral or overhead clearance is close.
- After the vehicle/equipment has been moved to a new site, set all brakes and/or locks. When grades are steep, block the wheels.

Definitions

Class I, All-terrain vehicle (ATV): A motorized off-highway vehicle, 50 in. (127 cm) or less in width, having dry weight of 800 lbs (362.9 kg) or less, and traveling on three or more low pressure tires (10 lbs [4.5 kg] psi or less), with a seat designed to be straddled by the operator.

Class I, Category G, ATV: An ATV intended for general recreational and utility use.

Class I, Category U, ATV: An ATV intended primarily for utility use.

Class II, ATV: A motorized off-highway vehicle with a width which exceeds 50 in. (127 cm) or having a dry weight that exceeds 800 lbs (362.9 kg), traveling on four or more low-profile, low-pressure tires (10 lbs [4.5 kg] psi or less) and having a bench seat.

NOTE: Utility Vehicles are designed to perform off-road utility tasks such as passenger and cargo transportation and are addressed separately below. Examples are Rangers, Rhino, M-Gators, Gators, and Mules.

Rollover Protective Structure (ROPS). A cab or frame that provides a safe environment for the tractor operator in the event of a rollover.

ALL TERRAIN VEHICLES (ATVS)

Qualifications

ATV operators will have completed a nationally recognized accredited ATV training course (such as provided by the Specialty Vehicles Institute of America or in-house resources that have been certified as trainers by an accredited organization) prior to operation of the vehicle.

The operator must pass an operating skills test prior to being allowed to operate an ATV. Proof of completion of this training will be maintained.

Equipment

All ATVs shall be equipped with:

- An operable audible warning device (horn);
- Headlights (if it will be used during hours of darkness);
- Taillights; and
- Brake lights.
- Mufflers and spark arresters.

All Class II ATVs will be equipped with ROPS and seatbelts

Operation

Only Class I and Class II ATVs with four or more wheels may be used. Class III ATV's may not be used.

The manufacturer's recommended payload will not be exceeded at any time.

Gloves and an approved motorcycle helmet with full-face shield or goggles will be worn at all times while operating a Class I ATV.

An ATV will not be driven on public roadways except to cross the roadway, and it will only be driven on a public roadway at designated crossing points or with a road guard (no paved road use unless allowed by the manufacturer).

A copy of the operator's manual will be kept on the vehicle and protected from the elements (if practicable).

Tires shall be inflated to the pressures recommended by the manufacturer.

Passengers are prohibited on Class I ATVs.

UTILITY VEHICLES

Utility vehicles are defined as specialty Class II ATVs designed to perform off-road utility tasks such as passenger and cargo transportation. Examples are Rangers, Rhino, M-Gators, Gators, and Mules.

Utility vehicle operators shall be trained and familiar with the use of all controls; understand proper moving, stopping, turning and other operating characteristics of the vehicle. Operators must review all training materials provided by the manufacturer for the specific vehicles, and training should be in accordance with appropriate manufacturer recommendations. A copy of the operator's manual shall be kept on the vehicle at all times and protected from the elements. At a minimum, training should address:

- Basic riding tips from the manufacturer's published literature for each vehicle.
- Reading terrain.
- Climbing hilly terrain.
- Descending a hill.
- Traversing a slope.
- Riding through water.
- Cargo carriers and accessories.
- Loading and unloading.
- Troubleshooting.
- Proper preventative maintenance, (i.e., oil levels, tire pressure requirements and scheduled maintenance requirements according to the manufacturer's guidelines.).

Utility vehicles shall be equipped with:

- Operable audible warning device (horn).
- Headlights.
- Taillights.
- Brake lights.
- Seatbelts.
- ROPS.

Occupancy in utility vehicles is limited to manufacturer designated seating that has built-in seatbelts. Passengers may not ride in the vehicle's back cargo area unless the vehicle is otherwise equipped. Note: When used for emergency response, medical litters may be placed in the back cargo area but must be secured as described below.

The manufacturer's recommended load carrying capacity, personnel capacity, or maximum safe vehicle speed shall not be exceeded at any time.

Cargo items will be secured as necessary to prevent movement/tipping. All loads over fifty pounds (to include medical litters) must be securely strapped to cargo tie-downs in the rear and to the cargo shelf in the front.

Seatbelts will be worn by operators and passengers of specialty vehicles where installed by the manufacturer. Operators and passengers shall wear goggles at all times when a utility vehicle, not equipped with a windshield, is in motion.

Utility vehicles will not normally be driven on public roadways except to cross the roadway, and will only be driven on a public roadway at designated crossing points or with a road guard. Utility vehicles that are allowed to operate outside a controlled work area and/or on public roads will meet the minimum vehicle safety standards in accordance with 49 CFR 571.5, to include ROPs, seatbelts and placement of "Slow Moving Vehicle" emblems where required.

Manufacturer-installed safety equipment will be maintained in working order and used in compliance with the requirement of this regulation and in accordance with manufacturer's recommendations.

RULES

Observe the following practices to help prevent accidents:

- Do not misuse utility vehicles.
- Reduce speed and exercise extreme caution on slopes or on rough ground.
- Do not overload vehicle and avoid shifting loads. Reduce load when operating over rough or hilly terrain.
- Do not stop or start suddenly when going uphill or downhill. Be especially cautious when changing direction on slopes.
- Stay alert for holes, rocks, and other hidden hazards in the terrain.
- Keep away from drop-offs, ditches, embankments, as well as ponds and other bodies of water. The machine could suddenly turn over if a wheel is over the edge of a cliff or ditch, or if an edge caves in.
- Keep front wheels straight at crest of hill or going over bumps.
- When descending a hill, remove foot from accelerator and apply brakes to reduce speed and maintain control.

Transport Loads Safely

- Be sure load is evenly distributed.
- Do not load above the load guard.
- Securely anchor all loads in cargo box.
- Reduce cargo box capacity when operating on rough or hilly terrain.
- Use existing trails. Avoid terrain such as dangerous slopes and impassable swamps. Watch carefully for sharp bumps, holes, ruts, or obstacles.
- Look ahead at terrain. Know what is coming and be prepared to react. Be alert for hazards.
- Keep front wheels straight at the crest of a hill or going over bumps.
- Reduce speed according to trail, terrain, and visibility conditions.
- The passenger should always use the hand holds.

Climbing or Descending a Hill

- Always use the brakes when going down slopes, the utility vehicle can speed up (freewheel) going down a slope. Engine or clutch braking effect is minimal.
- Balance loads evenly and secure them. Braking could shift the load and affect vehicle stability.
- Sit on the center of the seat and keep both feet within the foot platform.
- Never drive past the limit of visibility. Slow down near the crest of a hill until getting a clear view of the other side.
- If the vehicle stops or loses power going up a hill, lock the park brake to hold the vehicle on slope. Maintain direction of travel and release the brake slowly. Back straight down hill slowly while maintaining control. Do not turn the vehicle sideways. The vehicle is more stable in a straight forward or rearward position.
- If the utility vehicle begins to tip, turn the front wheel downhill to gain control before proceeding.

Riding Through Water

- Avoid water whenever possible. If the drive belt becomes wet, slippage will occur and the vehicle will lose power.
- Never cross any body of water where the depth may be unknown to the operator. As an operational guideline, deep water is considered anything in excess of 152 mm (6 in.) in depth. Tires may float, making it difficult to maintain control.
- Choose a course within the waterway where both banks have a gradual incline. Cross at a point known to be safe.
- Proceed at a slow steady speed to avoid submerged obstacles and slippery rocks.
- Avoid water crossings where the operation of a utility vehicle may cause damage to waterway beds or erode waterway shoreline.

FLD 38 HAND AND POWER HAND TOOLS

REFERENCES

29 CFR 1926 Subpart I
29 CFR 1910 Subpart P
ANSI Standard A10.3-1970, Safety Requirements for Explosive-Actuated Fastening Tools

RELATED FLDs

FLD 06 – Cold Stress
FLD 10 – Manual Lifting and Handling of Heavy Objects
FLD 16 – Pressure Systems: Compressed Gas Systems
FLD 35 – Electrical Safety

INTRODUCTION

Injuries from hand tools are often caused by improper use, using the wrong tool for the job, or from using a defective tool. Workers often assume that they know how to use a common hand tool. Working with something other than the simplest non-powered hand tools shall be performed only by those persons competent or qualified through formal training or documented experience.

Like all tools, hand and power tools must be maintained properly for effective use and safety. This Field Operating Procedure describes general safety guidelines for the four major categories of hand tools: cutting tools, torsion tools, impact tools, and power tools.

The use of any machinery, tool, material, or equipment which is not in compliance with any applicable OSHA 1910/1926 requirement is prohibited. Any tools or equipment identified as unsafe or defective will be “tagged or locked-out.” Controls shall be applied rendering the unsafe or defective tool or equipment inoperable. Any damaged or defective equipment shall be removed from its place of operation. Weston shall be responsible for the safe condition of tools and equipment used by employees, including tools and equipment that may be furnished by employees.

Tags shall be used as a means to prevent accidental injury or illness to employees who are exposed to hazardous or potentially hazardous conditions, equipment or operations, which are out of the ordinary, unexpected, or not readily apparent. Tags shall be used until the identified hazard is eliminated or the hazardous operation is completed. Tags need not be used where signs, guarding, or other positive means of protection are being used.

GENERAL SAFETY RULES – APPLICABLE TO USE OF ALL TOOLS

- Tools will be inspected prior to each use. Tools found to be unsafe will be tagged by the inspector “Do Not Use” and either repaired or removed from the site.
- Keep the work area clear of clutter.
- Keep the work area properly illuminated.
- Maintain and keep tools sharpened, oiled, and stored in a safe, dry place.
- Wear ear and eye protection when cutting, sawing, drilling, or grinding.
- Supervisor should instruct everyone using equipment on safe procedures before they use them.
- Inspect tools, cords, and accessories regularly and document any repairs.

- Repair or replace problem equipment immediately.
- Electric power tools must have a 3-wire cord plugged into a grounded receptacle, be double-insulated or powered by a low-voltage isolation transformer, and fitted with guards and safety switches.
- Machine guards must be in-place and not removed during equipment operation.
- Do not alter factory-supplied safety features on tools.
- Install and repair equipment only if you are qualified.
- Use the right tool for the job; for instance, do not use a screwdriver as a chisel or a wrench as a hammer.
- Carry a sharp tool pointed downward or place in a tool belt or toolbox.
- Protect a sharp blade with a shield.
- Store tools in drawers or chests with cutting edge down.
- When using power tools, wear long hair in a protective manner, do not wear jewelry or loose clothing, use safety glasses, respiratory protection, hard hats, etc., as needed/specified by the manufacturer. Note that protective gloves should not be worn when operating powered woodworking tools because of the possibility of the work piece snagging the glove and pulling the hand to the cutting surface.
- All hand-held power-driven tools must be equipped with one of the following: a constant pressure switch that shuts off the power upon release (e.g., circular saws, hand-held power drills, chain saws) or an on-off switch (e.g., routers, planers scrolls saws, jigsaws).
- Never leave a running tool unattended.
- All workers using hand and power tools must be properly trained, and training must be documented.
- Tools of a non-sparking material must be used if fire/explosion hazards exist.
- All fuel-operated tools shall be stopped and allowed to cool prior to being refueled, serviced, or maintained, and proper ventilation provided when used in enclosed spaces.
- Bench grinders shall be properly grounded. Work rests must be kept at a distance not to exceed 1/8 inch from the grinding wheel surface.
- All persons using grinders or abrasive wheels shall use approved eye-protective devices.
- Hand held grinders shall have grinding wheel guards in place during operation.
- Train personnel to recognize that tasks involving lifting, repetitive motion, excess pressure, vibration, awkward positions, and remaining stationary for prolonged periods and work in cold conditions increase the risk of musculoskeletal injury. Procedures for avoiding or minimizing risk include: using mechanical devices for lifting, following procedures in FLD 10 when manual lifting is necessary, using shock absorbing gloves when using vibrating tools, choosing tools that reduce gripping force and align joints in a neutral position or holding tools in an ergonomically neutral position, taking breaks or alternating repetitive jobs, and following procedures in FLD 06.
- Hand tools such as chisels and punches, which develop mushroomed heads during use must be taken out of service and reconditioned by qualified persons or replaced, as necessary.
- Broken or fractured handles on hammers, axes and similar equipment must be replaced promptly.
- Worn or bent wrenches must be replaced.

- Handles designed for use on files and similar tools must be used.
- Jacks must be checked periodically to ensure they are in good operating condition

TORSION TOOLS

Torsion tools are used to grip, fasten, and turn. These include wrenches, pliers, screwdrivers, vises, and clamps. There is a variety of each type of these tools. Selection is very important. Here are a few safety precautions for common torsion tools:

- Wrenches should always be pulled and not pushed. Pushing a wrench can cause a loss of control if there is a sudden release of pressure. A short, steady pull should be used rather than quick, jerky motions. Where available, use a socket wrench instead of an adjustable or open-ended wrench. Socket wrenches are generally easier to control, are more convenient, and are less likely to damage a bolt or nut. When using an adjustable wrench, the pressure should be applied to the fixed jaw
- Pipe wrenches can easily slip on pipes or fittings, causing injury. To prevent slipping, make sure that the pipe or fitting is clean and the wrench jaws are sharp and kept clean of oil and debris.
- Pliers should never be substituted for a wrench. They do not have the same gripping power and can easily slip on a tight object. When using cutting pliers, the object being cut can fly off and cause injury. Wear safety glasses when cutting with pliers.
- Screwdrivers are often misused. They should not be used for prying, or as punches or wedges. These misuses can damage the head of the screwdriver. A dull tip can cause the screwdriver to slip. The tip must be flat at the tip and tapered for a snug fit on the screw.
- When using vises, make sure that the vise is bolted solidly to a base (e.g., work bench). When cutting material in a vise, try to cut as close to the vise as possible to minimize vibration.
- Oil vises regularly.

Screwdrivers

- Most screwdrivers are not designed to be used on electrical equipment. Use an insulated screwdriver.
- Do not hold an object in the palm of one hand and press a screwdriver into it; place the object on a bench or a table.
- Never hammer with a screwdriver.
- Check for broken handles, bent blade, etc.
- Select a screwdriver of the proper size to fit the screw.
- Screwdrivers with a split or splintered handle shall not be used.
- The point shall be kept in proper shape with a file or grinding wheel.
- Screwdrivers shall not be used as a substitute punch, chisel, nail-puller, etc.

Pliers

- Do not use pliers as a substitute for hammers or wrenches.
- Use insulated pliers when doing electrical work.

- Inspect pliers frequently to make certain that they are free of breaks or cracks.
- Pliers shall be kept free from grease and oil and- the teeth or cutting edges shall be kept clean and sharp.
- The fulcrum pin, rivet or bolt shall be snug but not tight.

Wrenches

- Select the correct size of wrench for the job.
- Never use a piece of pipe or another wrench as a wrench handle extension.
- Too much leverage can ruin a tool and cause injury.
- To avoid sudden slips, stand in a balanced position and always pull on the wrench instead of pushing against the fixed jaw.
- Only wrenches in good condition shall be used; a bent wrench, if straightened, has been weakened and shall not be used.
- Watch for sprung jaws on adjustable wrenches.
- Always pull toward yourself, never push, since it is easier to brace against a sudden lunge toward you should the tool slip or break.
- When using a wrench on a tight nut - first use some penetrating oil, use the largest wrench available that fits the nut, when possible pull on the wrench handle rather than pushing, and when possible apply force to the wrench with both hands while both feet are firmly placed. Always assume that you may lose your footing - check the place where you may fall for sharp objects.
- Keep all pipe wrenches clean and in good repair. The jaws of pipe wrenches should be wire brushed frequently to prevent an accumulation of dirt and grease that would otherwise build up and cause wrenches to slip.
- Never use pipe wrenches in place of a rod holding device.
- Replace hook and heel jaws when they become visibly worn.
- Position your hands so that your fingers will not be smashed between the wrench handle and the ground or other work surface; when breaking joints the wrench may slip or the joint may suddenly let go.

IMPACT TOOLS

Impact tools include various types of hammers such as riveting hammers, carpenter's claw hammers, and sledgehammers. The main hazard associated with all these tools is damage to the hands and arms. The following safety procedures should be employed when using hammers:

- The handle shall be securely fitted and suited for the type of job and type of hammerhead. The striking face of the hammer shall be kept well dressed according to the application.
- The handle shall be smooth and free of oil to prevent slippage.
- Safety goggles shall be worn at all times when hammering to protect from flying nails, wood chips, and metal or plastic fragments.

- To properly drive a nail, hold the hammer near the end of the handle and start off with a light blow. Increase power after the nail is set.
- To avoid chipping or spalling of the hammerhead, use the lightest swing possible, hammer straight and not on an angle. Inspect the head of the hammer for potential chipping and spalling.

Hammers

- Use the correct hammer for the type of work to be done.
- Have an unobstructed swing when using a hammer and watch for overhead interference.
- Check for defects before using.
- The head of a hammer shall be wedged securely and squarely on the handle and neither the head nor the handle shall be chipped or broken.

CUTTING TOOLS

The main hazard associated with cutting tools is tool slippage. A dull tool or poor tool technique can cause a slip, which can redirect the cutting part of the tool toward the body. In addition, a sudden release or change in the force applied to a tool can throw the user off balance, possibly falling into another object, which may cause injury. To prevent slippage, tools shall be kept sharp and handled in such a way that, if a slip occurs, the direction of force will be away from the body. In addition, cutting along the grain of a material can help prevent changes in the pressure applied to the tool, thereby preventing slippage.

Chisels

- Always wear safety goggles or a face shield when using a chisel.
- Drive wood chisel outward and away from your body.
- Do not use chisels to pry.
- Keep edges sharp for most effective work and protect when not in use.

Knives

- Always cut away from the body.
- Keep hands and body clear of the knife stroke.
- Use a locking blade knife when possible.
- Keep blades sharp.
 - Knives and other sharp or edged tools must be maintained in proper condition. A sharp edged tool, used properly, is safer than a dull or improperly maintained tool.
 - When not in immediate use edged tools must be properly secured via, sheathing, closing, capping or covering.
 - Any task involving the use of an edged tool must be properly evaluated, alternatives to edged tools reviewed and training in the proper use, maintenance and handling verified by management and/or the site safety officer.
 - Knives, box cutters or like tools will not be authorized for cutting plastic wire ties or tubing. Use appropriately shaped and sized wire cutters or snips.
 - Remove knives from carry on luggage and place in checked baggage.

POWERED TOOLS

- Portable power tools shall be carefully inspected before use and shall be kept repaired.
- Switches and plugs must operate properly, and the cords must be clean and free from defects.
- Portable powered tools capable of receiving guards and/or designed to accommodate guards shall be equipped with guards to prevent the operator from having any part of his body in the danger zone during the operating cycle.
- Electric powered portable tools with exposed conducting parts shall be grounded. Portable tools protected by an approved system of double insulation, or its equivalent, need not be grounded. Where such an approved system is employed, the equipment shall be distinctively marked.
- Hand-held powered tools of a hazardous nature such as circular saws having a blade diameter greater than two inches, chain saws, percussion tools, drills, tappers, fasteners, drivers, grinders with wheels greater than two inches in diameter, disc sanders, belt sanders, reciprocating saws, saber scroll saws and jig saws with blade shanks greater than one-fourth inch, and other similarly operating powered tools shall be equipped with a constant pressure switch or control ("dead-man switch") that will shut the power off when the pressure is released.
- Portable circular saws having a blade diameter over two inches shall be equipped with guards or hoods which will automatically adjust themselves to the work when the saw is in use, so that none of the teeth are exposed to contact above the work. When withdrawn from the work, the guard shall completely cover the saw to at least the depth of the teeth. The saw shall not be used without a shoe or guide.
- Pneumatic powered portable tools shall be equipped with automatic air shut-off valves that stop the tool when the operators hand is no longer in contact with the tool. Safety clips, retainers, or other effective means shall be installed on pneumatic tools to prevent the tools from accidentally misfiring.
- Abrasive wheels with a diameter of more than two inches shall be used only on machines provided with safety guards. The guards shall cover the spindle end, nut, and flange projections. Guards on operations where the work provides a suitable measure of protection to the operator may be so constructed that the spindle end, nut, and other flanges are exposed.
- Explosive-actuated fastening tools' muzzle ends shall have a protective shield or guard designed to confine any flying fragments or particles. The tool shall be so designed that it cannot be fired unless it is equipped with a protective shield or guard. Weston Solutions, Inc. employees are not permitted to use a power-actuated tool until properly trained as prescribed by the manufacturer.

Extension Cords

See FLD 35, Electric Safety, for requirements and procedures for using extension cords.

SPECIALTY TOOLS

Pneumatic Powered Tools

Tools powered by air must be inspected and maintained as described above. Hose or tubing used to deliver air to pneumatic tools must be used as required and according to procedures in FLD 16, Pressure Systems: Compressed Gas Systems.

Powder-Actuated Tools

- Only employees who have been trained in the operation of the particular tool in use shall be allowed to operate a powder-actuated tool.
- Powder-actuated tools shall be tested each day before loading to see that safety devices are in proper working condition. The method of testing shall be in accordance with the manufacturer's recommended procedure.
- Any tool found not in proper working order, or that develops a defect during use, shall be immediately removed from service and not used until properly repaired.
- Personal protective equipment shall be selected in accordance with manufacturer's recommendations and in consideration of the potential hazards of the task.
- Tools shall not be loaded until just prior to the intended firing time. Neither loaded nor empty tools are to be pointed at any employees. Hands shall be kept clear of the open barrel end.
- Loaded tools shall not be left unattended.
- Fasteners shall not be driven into very hard or brittle materials including, but not limited to, cast iron, glazed tile, surface-hardened steel, glass block, live rock, face brick, or hollow tile.
- Driving into materials easily penetrated shall be avoided unless such materials are backed by a substance that will prevent the pin or fastener from passing completely through and creating a flying missile hazard on the other side.
- No fastener shall be driven into a spalled area caused by an unsatisfactory fastening.
- Tools shall not be used in an explosive or flammable atmosphere.
- All tools shall be used with the correct shield, guard, or attachment recommended by the manufacturer.
- Powder-actuated tools used by employees shall meet all other applicable requirements of American National Standards Institute, A10.3-1970, Safety Requirements for Explosive-Actuated Fastening Tools.

FLD 39 ILLUMINATION

RELATED FLDs

FLD 08 – Confined Space Entry Program
FLD 10 – Manual Lifting and Handling of Heavy Objects
FLD 12 – Housekeeping
FLD 13 – Structural Integrity
FLD 18 – Operation and Use of Boats
FLD 22 – Heavy Equipment Operation
FLD 23 – Cranes, Rigging, and Slings
FLD 33 – Demolition
FLD 38 – Hand and Power Hand Tools

PROCEDURE

While work is in progress, offices, facilities, access-ways, working areas, construction roads, etc., will be lighted by at least the minimum light intensities specified in Table 1.

Office lighting will be in accordance with American National Standards Institute (ANSI)/ Illuminating Engineering Society of North America (IESNA) RP-1.

Roadway lighting will be in accordance with ANSI/IESNA RP-8.

Marine lighting will be in accordance with ANSI/IESNA RP-12.

Means of Egress

- Means of egress will be illuminated, with emergency and non-emergency lighting, to provide a minimum of 1 footcandle (fc) (lumens per square foot [lm/ft^2]) (11 lux [lx], measured at the floor. (Reference NFPA 101)
- The illumination will be arranged so that the failure of any single lighting unit, including the burning out of an electric bulb, will not leave any area in total darkness.

Lamps and fixtures will be guarded and secured to preclude injury to personnel. Open fluorescent fixtures will be provided with wire guards, lenses, tube guards and locks, or safety sockets that require force in the horizontal axis to remove the lamp.

Lamps for general illumination shall be protected from accidental contact or breakage. Protection shall be provided by elevation of at least 7 ft (2.1 m) from normal working surface or suitable fixture or lamp holder with a guard.

TABLE 1 - MINIMUM LIGHTING REQUIREMENTS

Facility or Function	Illuminance – lx (lm/ft²)
Accessways	
– general indoor	55 (5)
– general outdoor	33 (3)
– exitways, walkways, ladders, stairs	110 (10)
Administrative areas (offices, drafting/meeting rooms, etc.)	540 (50)
Chemical laboratories	540 (50)
Construction Areas	
– general indoor	55 (5)
– general outdoor	33 (3)
– tunnels and general underground work areas, (minimum 110 lx required at tunnel and shaft heading during drilling, mucking, and scaling)	55 (5)
Conveyor routes	110 (10)
Docks and loading platforms	33 (3)
Elevators (freight and passenger)	215 (20)
First-aid stations and infirmaries	325 (30)
Maintenance/Operating Areas/Shops	
– vehicle maintenance shop	325 (30)
– carpentry shop	110 (10)
– outdoors field maintenance area	55 (5)
– refueling area, outdoors	55 (5)
– shops, fine detail work	540 (50)
– shops, medium detail work	325 (30)
– welding shop	325 (30)
Mechanical/electrical equipment rooms	110 (10)
Parking areas	33 (3)
Toilets, wash, and dressing rooms	110 (10)
Visitor areas	215 (20)
Warehouses and Storage Rooms/Areas	
– indoor stockroom, active/bulk storage	110 (10)
– indoor stockroom, inactive	55 (5)
– indoor rack storage	270 (25)
– outdoor storage	33 (3)
Work areas – general (not listed above)	325 (30)

FLD 49 SAFE STORAGE OF SAMPLES

REFERENCE

DOT Emergency Response Guide (ERG)

To ensure that multi-media samples collected in the course of WESTON work assignments are not stored in a manner that creates undue hazard to WESTON employees or others.

PROCEDURE

Samples that are transported from a WESTON work location must be classified and packaged in compliance with U.S. Department of Transportation (DOT) regulations or alternatively in accordance with International Air Transport Association (IATA) regulations. WESTON's manual of Procedures for Shipping and Transporting Dangerous Goods must be consulted to determine if the samples will be classified as either "environmental" or "hazardous materials" samples.

Environmental Samples

Environmental samples are not subject to DOT or IATA dangerous goods regulations and must be packaged to protect their integrity during transportation and temporary storage and should have appropriate chain-of-custody documentation. These samples may be brought to a WESTON office location or rented space to verify sample documentation and repackaging (e.g., with ice or cold packs). Minor spill clean-up capability is required.

Once secured for shipment, these samples can be temporarily stored for the next day ground or air shipment pick-up. Under no circumstances are samples to be stored beyond the time necessary to arrange for transportation to a laboratory.

Hazardous Materials Samples

These samples are subject to DOT and/or IATA dangerous goods regulations and must be packaged and labeled according to the appropriate regulations, including completed chain-of-custody documentation prior to being transported from the WESTON work site. WESTON drivers must have the documentation for the samples and a DOT Emergency Response Guide (ERG) readily available in the vehicle. The ERG is available on-line at: <http://hazmat.dot.gov/pubs/erg/gydebook.htm> and appropriate sections can be copied to accompany samples being transported by vehicles driven by WESTON employees.

Under normal circumstances these samples should be shipped from the field and never brought back to a WESTON office location or into a rented space. If it is not possible to ship the samples from the field during the same day they are collected, a properly packaged, labeled, and sealed sample shipping container may be brought back to a WESTON office location for shipment to a laboratory the next business day - provided the temporary storage location is secure from access by any personnel who are not trained in shipping hazardous materials. Under no circumstances are samples to be stored in rented space; if necessary, secure temporary storage in a locked vehicle may be authorized. Note that some office leases do not permit the storage of hazardous materials and the lease will govern whether such materials can be stored overnight.

INSPECTION FOLLOW-UP

Shipping procedures for samples should be included in the site-specific health and safety plan (HASP) and reviewed for compliance with these procedures prior to approval. EHS audits will include a review to sample shipping and storage procedures.